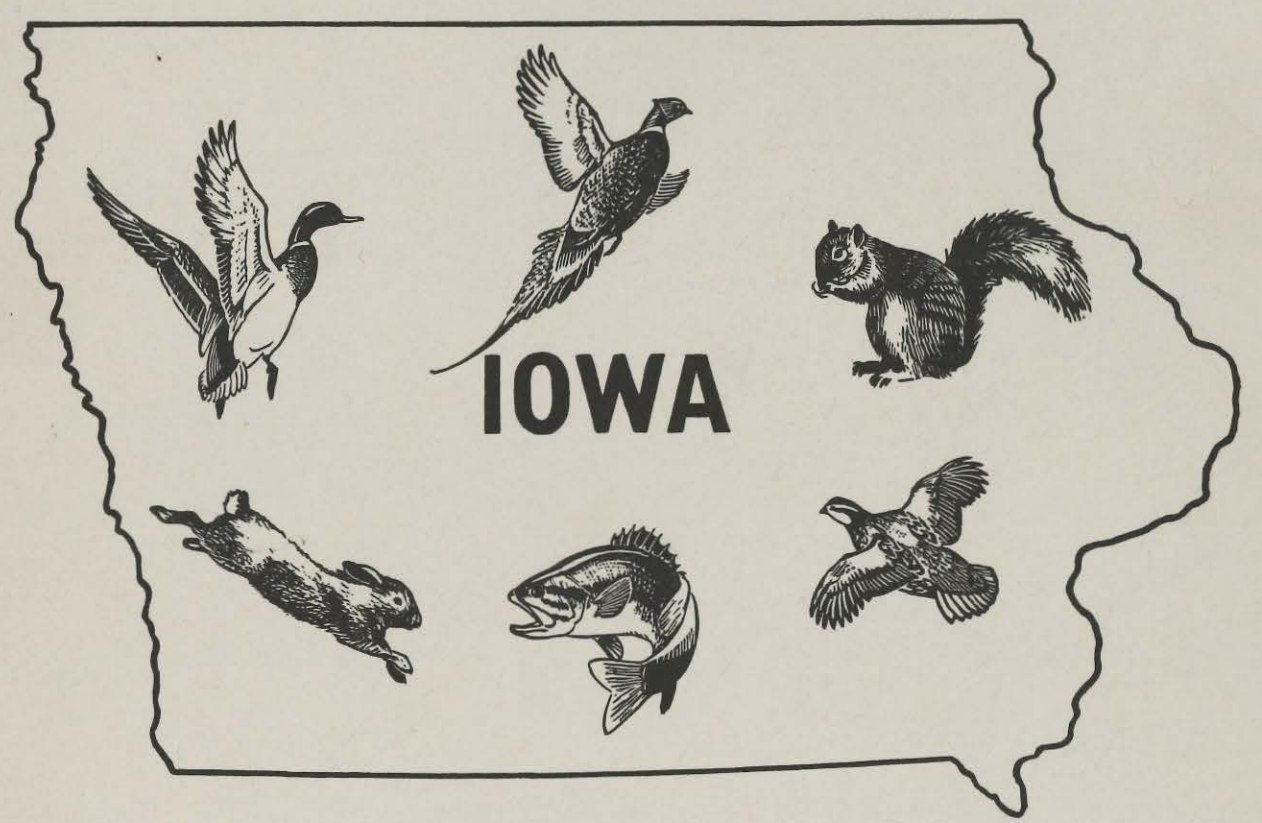
January, February, March 1953 Vol IV No 1

Vol. 5 No. 1 1953 #1

~~Vol. 4 No. 1 1952~~

QUARTERLY BIOLOGY REPORTS



FISH AND GAME DIVISION — BIOLOGY SECTION

STATE CONSERVATION COMMISSION

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A MODIFIED VOLUNTARY CREEL CENSUS ON NORTHEAST IOWA STREAMS

By R. E. Cleary

Maintaining a general creel census of a continuing basis on streams over a section of the state or on a state-wide basis is definitely an undertaking. A complete or even partially complete census on a major river system is out of the question for obvious reasons. Success and effort data on river angling are usually gathered on a spot-check basis. The states which carry on such activities use their conservation officers to an advantage in collecting these data. In their routine river patrols, the conservation officer usually checks the catch and secures other pertinent information from a set ratio of contacts, usually every third or fifth contact. This lends an air of randomness to the sample and does not add too much to the regular duties of the officer. Under this system there are several limiting conditions which definitely will affect the data. In order to check a goodly number of anglers as to the legality of their activities, which of course is the main job of the officer, he usually does his checking at angling concentration points and on days when the largest number of anglers will be out. As the season progresses, the numbers of anglers drop and the officer turns to other phases of his work program. His information is therefore

replies from 89 out of 163 potential contacts in 1950 (55%); 100 out of 230 in 1951 (44%); and 102 out of 235 in 1952 (43%). They sent in weekly reports as to their fishing, listing date, stream, species, number, length or weight and hours spent fishing. These reports were made on self-addressed 4x6 cards and of those sent in, there were remarkably few that were unusable.

In 1951 we had 50 of the 86 original contacts still reporting and in 1952, 33 were still turning in data on their stream angling. This means a 42% turnover in 1951, and when the anglers reporting for the first time in 1951 are added to the 33 originals, 40% of the 1952 contacts were new to the project. Despite this turnover, cooperators took .77 warm-water stream fish per hour in 1950, .76 in 1951 and .77 in 1952. These catch per hour figures included other game fish species in addition to those listed specifically in tables 1 to 4. Calculating the weight per rod hour, we find that anglers took .91 pounds per rod hour in 1950, .78 pounds in 1951 and 1.20 pounds per rod hour in 1952. Trout fishing varied somewhat more (Table I). Although the number of angling hours varied from year to year--4925 in 1950, 5996 in 1951 and 7969 in 1952--each year one trip out of four was unsuccessful and the average trip was a little over three hours in duration. The number

of trips varied each year with the fishing conditions and the number reporting, the first factor seemingly being the more important of the two.

TABLE I.

THREE-YEAR CREEL AVERAGES FOR NORTHEAST IOWA RIVERS ON PRINCIPAL GAME FISH

Species	No./Rod Hour			Calculated Lbs./Rod Hour		
	1950	1951	1952	1950	1951	1952
Trout	1.22	1.35	1.18	.37	.48	.45
Catfish	.70	.57	.61	1.03	.86	.83
S. M. Bass	.62	.48	.48	.72	.50	.57
L. M. Bass	.73	.66	.82	1.07	.86	1.13
Crappie	1.20	1.65	1.56	.43	.65	.52
Walleye	.58	.75	.42	.69	.75	.76
No. Pike	.61	.64	.46	.74	1.47	.98
Mixed Bag	.93	1.09	1.09	.97	.82	1.04

Table I shows the variation in fishing success for the principal stream species over the three-year period. In 1950 the spring high water extended into early July, but from there on until the freeze-up in early November, the rivers were clear with moderately falling water. In 1951, the rivers of northeast Iowa were abnormally high and turbid into the month of August and remained high until freeze-up in the first week of November. In 1952, the spring run-off was of little consequence and the rivers were moderately low and clear by the first week in June. The water level steadily declined with no precipitation to speak of until the third week in November. There was no hard freeze until the second week in December, at which

exactness through interpolation. About 80% of the fish reported come in as individual total lengths. The other 20% are given as estimated or exact weight. This is all done by the individual cooperator. Those which are expressed in total length in inches, seldom if ever are reported in any less than one half inch frequencies. It has been the procedure in the past to transpose these fish from inches into pounds and express the results in number per hour and calculated weight per hour. For these tables the average interpolated weight per fish was re-interpolated into average length per fish. This gives an expression of approximate average length and average weight which is more of an interest factor than a scientific piece or collection of data. For this reason the tables will not bear up under exact factual analysis. It can be said, however, that the trout being caught are progressively getting larger, the 1952 walleyes were larger than the previous years and the 1951 and 1952 northern pike are of a larger size than the 1950. All other species seem to enter the catch at the same approximate average size range each year.

TABLE III

TRENDS IN AVERAGE LENGTH (IN INCHES) OF SOME PRINCIPAL GAME FISH IN RIVERS OF NORTHEAST IOWA

River	Catfish			S. M. Bass			Crappie		
	1950	1951	1952	1950	1951	1952	1950	1951	1952
Cedar	15.4	17.7	15.7	13.5	12.4	13.6	9.1	9.5	9.0
Iowa	15.4	15.8	15.5	12.7	11.3	14.2	8.3	---	9.2
Maquoketa	16.0	15.3	15.9	13.8	10.5	11.6	7.0	8.5	8.5
Shellrock	15.3	15.5	15.3	12.8	11.0	15.3	9.5	9.8	---
Turkey	15.9	16.3	15.9	13.4	12.6	11.0	---	---	---
Up. Iowa	----	12.6	16.5	12.2	12.6	14.0	9.8	9.0	10.2
Wapsie	15.1	16.0	15.4	14.7	13.1	13.3	8.4	8.8	8.1
Miss.	17.2	19.0	13.7	14.3*	14.0*	14.1*	9.0	10.1	8.6

(*--L. M. Bass)

TABLE IV

TRENDS IN AVERAGE WEIGHT (IN POUNDS) OF SOME PRINCIPAL GAME FISH IN RIVERS OF NORTHEAST IOWA

River	Catfish			S. M. Bass			Crappie		
	1950	1951	1952	1950	1951	1952	1950	1951	1952
Cedar	1.29	1.93	1.39	1.23	.99	1.29	.37	.41	.35
Iowa	1.29	1.44	1.31	1.07	.75	1.45	.28	--	.38
Maquoketa	1.53	1.25	1.45	1.34	.60	.83	.18	.30	.30
Shellrock	1.24	1.31	1.27	1.05	.70	1.81	.43	.48	--
Turkey	1.45	1.58	1.46	1.24	1.03	.69	--	--	--
Up. Iowa	----	.59	1.62	.94	1.04	1.38	.47	.35	.56
Wapsie	1.18	1.52	1.30	1.62	1.15	1.34	.29	.34	.26
Miss.	1.80	2.50	.75	1.44*	1.25*	1.34*	.35	.53	.32

(*--L. M. Bass)

SUMMARY

1. A modified voluntary creel census in which hand-picked, expert fishermen furnish data as to species, number, weight or length and number of angling hours for each trip on stream or river fishing has been used since 1950 in northeast Iowa.

2. Despite an annual contact turnover of 40%, the

average catch of warm-water stream fish varied only slightly:.77 fish/hour in 1950, .76 fish/hour in 1951 and .77 fish/hour in 1952.

3. Although fishing pressure varied from year to year the contacts averaged one unsuccessful trip out of four during each angling season.

4. The number and calculated weight/rod hour of seven principal game fish taken in streams are given for the years 1950-1952. No definite trends are observed with the exception that the average trout increased in weight each year.

5. Calculated average length and weight are given for the principal seven stream game fish for the years 1950-1952. With the exception of Trout, Walleye and Northern Pike, which increased in size since 1950, other species remained at approximately the same average size for the three angling years.

7. Trends in average lengths and weights for Catfish, Smallmouth Bass and Crappies for individual rivers in northeast Iowa are given for the years 1950-1952.

WINTER CREEL CENSUS OF LAKE FISHERMEN

By E. T. Rose

Continuing the trend toward liberalized fishing regulations, the Iowa Conservation Commission again extended the legal closing date of November 30 to February 15, 1953. Thus for the third consecutive year, winter angling has been permitted for all species of fish except trout. An extensive creel census was again conducted in the lakes having the greatest fishing pressure. As before, West Okoboji Lake was the most heavily fished; although unexpectedly good angling on adjacent Spirit Lake attracted many former Okobojians.

Two census clerks were employed this winter on West Okoboji and one on Spirit Lake. Ice conditions were unsafe for car travel on Okoboji; consequently, in order to obtain a good coverage of anglers by foot travel, the two men were necessary. At Spirit Lake, the ice was sufficiently thick to permit safe travel by car, thus one clerk readily contacted the majority of anglers.

The census began on December 1, 1952 and continued until the close of the season on February 15, 1953. As in previous censuses (Rose, 1951, 1952) clerks contacted daily every fish shanty and fisherman in the open. Each man's catch was recorded including the number of each species, number of hours fished and the county or State

of residence. The daily reports were recorded at weekly intervals, and are combined in the season summaries for the two lakes in tables. No voluntary records are included in this report, all are from personal contact with the anglers on the lakes.

West Okoboji Census

Freeze-up of the Iowa lakes was unusually early this year, thus permitting a two weeks longer season than in the winter of 1951-1952 and about a week longer than in 1950-1951. Intensive angling began in the bay regions of the lake while most of the main lake was still open water. During all of the first week of the census angling was confined to one small bay (Smith's Bay). Thereafter ice conditions improved and all desirable regions of the lake were occupied by anglers.

Basic summaries of each week's fishing on West Okoboji (Table I) includes the total number of each species caught, together with the combined total of all fish, the total number of men contacted and their combined total hours of effort. These data are used to calculate the average catch per angler and average catch per hour.

WEEKLY AND SEASONAL FISH CENSUS SUMMARIES

Table No. 1

Lake West Okoboji

DATE	Dec. 1-7	Dec. 8-14	Dec. 15-21	Dec. 22-28	Dec.29 Jan. 4	Jan. 5-11	Jan. 12-18	Jan. 19-25	Jan.26 Feb. 1	Feb. 2-8	Feb. 9-15		TOTALS
CRAPPIE									1]	10	5		16
PERCH	1046	1444	1041	1279	2480	1565	1119	1621	1253	1756	1310		15914
N. PIKE	7	12	30	43	48	32	10	19	15	31	34		281
L. M. BASS		1		1						3	1		6
WALLEYE	30	13	40	107	120	52	21	94	195	77	164		913
S. M. BASS										3	4		7
W. BASS								2					2
BLUEGILL				1					1		1		3
WEEKLY TOTALS	1083	1470	1111	1431	2648	1649	1150	1736	1465	1880	1519		17142
TOTAL MEN	237	433	436	586	1024	740	399	714	596	709	701		6575
TOTAL HOURS	588	897	920	1559	3265	2263	1080	2141	1849	1801	1949		18312
AVERAGE FISH/MAN	4.57	3.39	2.55	2.44	2.58	2.23	2.88	2.43	2.46	2.65	2.66		2.60
AVERAGE FISH/HOUR	1.84	1.63	1.21	0.92	0.84	0.73	1.06	0.81	0.80	1.04	1.28		0.93

WEEKLY AND SEASONAL FISH CENSUS SUMMARIES

Table No. 3

Lake Spirit

DATE	Dec. 1-7	Dec. 8-14	Dec. 15-21	Dec. 22-28	Dec.29 Jan. 4	Jan. 5-11	Jan. 12-18	Jan. 19-25	Jan.26 Feb. 1	Feb. 2-8	Feb. 9-15		TOTALS
CRAPPIE													
PERCH	19	54	210	150	802	866	577	801	715	1418	1604		7216
N. PIKE	1		2	8	17	27	14	23	11	46	29		178
L. M. BASS													
WALLEYE	31	63	108	114	190	155	67	53	65	115	124		1085
S. M. BASS									13		6		19
W. BASS													
BLUEGILL													
WEEKLY TOTALS	51	117	320	272	1009	1048	658	877	804	1579	1763		8498
TOTAL MEN	27	40	86	191	492	471	318	535	388	684	705		3937
TOTAL HOURS	56	126	176	503	1359	1417	898	1415	1242	2236	2357		11785
AVERAGE FISH/MAN	1.88	2.92	3.72	1.45	2.05	2.22	2.07	1.66	2.07	2.31	2.50		2.15
AVERAGE FISH/HOUR	0.91	0.92	1.80	0.54	0.74	0.74	0.73	0.62	0.65	0.71	0.75		0.72

Winter fishing was again considered good by most of the anglers on the lake. Much of the interest at West Okoboji continues in observing the vast schools of perch and other species that swim by in the crystal clear water. Shanty fishermen particularly were amazed and of course intensely exasperated at the few that could be caught from a large school, or as frequently occured, none were caught. The great majority of the anglers fished for the yellow perch using all sorts of innovations from ice flies, cranberies and "glow worms" to small pieces of strap iron for bait. Small minnows were of course the usual and most reliable bait. Methods of angling were about the same as before (Rose, 1951) for the principal species, perch and walleyes.

Several counts of fish shanties and the percentage of occupancy were made throughout the season. On January 5, there were 356 shanties on the lake, 13 percent of which were occupied. The fcllowing week, on January 12, there were 409 shanties and 9 percent were occupied by anglers. On January 26, 374 shanties were counted, 13 percent were occupied. Last winter the most shanties counted was 505, and 10 percent were occupied.

The over-all catch of fish this winter was considerably greater than during the previous two winters. Although the season was longer this year than formerly,

there were fewer anglers on the lake and much less unit effort than in the previous two winters. This indicates an improvement in fishing by generally accepted standards of comparison.

The basic summaries of the three winter censuses are compared in the following Table (II).

SPECIES	Winter 1950-1951	Winter 1951-1952	Winter 1952-1953
PERCH	14,150	14,244	15,914
WALLEYE	815	999	913
NORTHERN PIKE	236	133	281
CRAPPIE	48	3	16
SMALLMOUTH BASS	18	8	7
LARGEMOUTH BASS	17	7	6
BLUEGILL	13	2	3
BULLHEAD	9	1	
SUCKER	1		
WHITE BASS		1	2
SEASON TOTALS	15,307	15,398	17,142
ANGLERS CONTACTED	7,203	7,074	6,575
TOTAL HOURS OF FISHING	21,175	23,230	18,312
AVERAGE CATCH PER ANGLER	2.12	2.17	2.60
AVERAGE CATCH PER HOUR	0.72	0.66	0.93

Table II. Three seasons of winter creel census on West Okoboji.

The uniformity of catch in the perch and walleye is very striking, since there is essentially little difference in the three seasons. Considering the reduced effort this season, we must conclude that an overall improvement in fish populations has occurred, a scarcity of natural foods prevailed causing increased vulnerability to catch or an increasing degree of skill by anglers has been developed over the past three seasons. Summer survey data indicated good supplies of forage fish and an extraordinarily high reproduction in bluegills--a principal item of diet for perch and walleye. Thus we can interpret these data as indicative of improved populations in West Okoboji. All anglers contacted remarked about the great number of fishes observed this winter, particularly of perch and young walleyes.

Sex Ratio and Weights

Inconclusive data was obtained concerning the ratio of male to female fish caught. Of 198 perch caught by Biology personnel, 61.6 percent were female fish. The average weight of perch taken this winter was about o.5 pounds. This multiplied by the 15,914 perch recorded caught gives 7,957 pounds of perch harvested. Of 28 walleyes checked, 26.1 percent were females. This is a low percentage, but probably nearly correct. The walleyes taken this year were much smaller than usual, averaging

about 1.5 pounds in weight, for a total harvest of a known 1,369 pounds.

Residence of the Okoboji Anglers

Again the great majority of the anglers were from the immediate vicinity of the lakes region; however, this winter six more counties were represented than last year and one less State (Rose, 1952). Following are the counties and numbers of anglers contacted on West Okoboji this winter: Dickinson-2,680, Clay-1,367, O'Brien-885, Osceola-544, Emmett-329, Lyon-168, State of Minnesota-110, Sioux-101, Buena Vista-86, Palo Alto-51, Webster-45, Cherokee-41, Plymouth-38, Woodbury-31, Kossuth-28, Polk-22, Carroll 20, Story-12, Crawford-9, Dallas-5, Floyd-5, Montgomery, Pocahontas, Shelby and Winnebago each-4, Ida and Calhoun each-3, Madison, Greene, Mills, Gutherie, Wright, Sac, Hamilton, Boone, Hardin, Harrison and the State of South Dakota each-2, Pottawattamie, Humboldt, Cerro Gordo, Franklin and the State of Wisconsin each-1.

Spirit Lake Census

Angling was very much improved in Spirit Lake this winter. The total catch was about half that of West Okoboji; however, the unit effort success was almost equal to it. Many phenomenally large perch were taken this winter, much to the amazement of the "barber-shop biologists"

who had, during the previous summer vociferously maintained that the perch "were gone" in Spirit Lake. Approximately one-half of the perch caught this winter averaged well over a pound in weight. One randomly selected string of 30 checked by the census clerk weighed exactly 33 pounds. These fish were largely 7 and 8 years of age which of course is approaching their life expectancy. The balance of the perch were mostly small--5 to 7 inches in length. Most of the walleyes taken were small, averaging about 13 inches in length. Many of the good sportsmen returned these "hammer-handles" to the lake if they were unharmed, but the majority kept them regardless of the small size.

The basic weekly and total summary of the census record throughout the winter season are recorded in Table 3. Here at a glance it is obvious that the perch and walleyes are the important species for the winter angler, and that the lake was used by a good many fishermen. Last winter (Rose, 1952) 94 men were recorded on Spirit Lake as compared with almost 4,000 this winter.

The number of anglers were recorded from the following counties and States: Dickinson, 1,437, Emmet, 608, O'Brien, 437, Clay, 194, Osceola, 154, Kossuth, 83, Polk, 35, Plymouth, 32, Cherokee, 17, Palo Alto, 15, Humboldt, 14, Lyon, 13, Woodbury, 12, Buena Vista, 11, Adair, 10, Sioux,

6, Buchanan, 5, Calhoun, Ida and Winneshiek, 4, Hancock and Hardin, 3, Shelby, Story, Sac, Carroll and the State of South Dakota, each 2. The Minnesota record was very high, with 826 men recorded from that State.

Fishing at other Iowa Lakes

Several spot-checks were made on other less heavily fished lakes this winter. Angling was reported as fairly good at Silver Lake in Dickinson County and at Five Island Lake in Palo Alto County until low oxygen concentrations produced a decline in catches. At Five Island many limit catches of perch and a few Northern Pike were observed during oxygen sampling trips. No effort was made to obtain a census however.

Conservation Officers provided some data on Lost Island and Trumbull Lakes and Merle Linquist made one check on Clear Lake. The data from these reports are included in Table IV.

Table IV
Spot Checks on other Lakes

NAME OF LAKE	TRUMBULL*	LOST ISLAND**	CLEAR
Northern Pike	175	3	0
Yellow Perch	0	5	25
Walleye	0	44	2
Yellow Bass	0	0	9
Total Fish	175	52	36
Total Men	136	56	25
Total Hours	296	165	56
Average Fish/Man	1.29	0.91	1.44
Average Fish/Hour	0.59	0.31	0.64

*--Checks by Basil Downing and E. T. Rose
**--Checks by Harold Johnson

In addition to the spot check by Linquist at Clear Lake, some voluntary reports were collected that are of some interest. Twenty-eight anglers caught a total of 47 walleyes, 29 northern pike, 511 perch, 460 yellow bass, 21 largemouth bass, 2 bluegills and 1 crappie during the entire season at Clear Lake. This averages about 38 fish per angler during the season. These voluntary reports are doubtless not accurate, but do indicate that fishing was fair at the lake. They reported seeing a large number of young (?) walleyes, many more northern pike than last year and a very definite increase in perch and bluegills. They reportedly did not see as many adult walleyes as in the past winters.

Summary

West Okoboji Lake was again the most popular winter fishing lake in Iowa. A total of 6,575 fishing trips were recorded by personal contact with anglers on the lake. These anglers fished a total of 18,312 hours, for an average of 2.79 hours per trip. The average angler caught 2.60 fish at the rate of 0.93 fish per hour. In comparison with the previous two winter records, the past winter's success was considerably greater. This again indicates that winter angling is not harmful to standing crops of fish.

Winter angling on Spirit Lake was also fairly

productive. A total of 3,937 fishing ripis were recorded during the winter and the average angler fished 2.99 hours taking 2.15 fish at the rate of 0.72 fish per hour. While not as productive, many preferred to fish here to get away from the congestion on West Okoboji.

Summer angling on West Okoboji is only slightly better than in winter. The average catch per hour for the past seven summers (May 15 to July 1) is 0.94, and for last summer only, the catch was 0.97 fish per hour. Thus the past winter's record of 0.93 appears to be about average for the lake.

Considerably better fishing success has been recorded on Spirit Lake during the summer census. The average catch per hour for the past eight summers (May 15-July 1) is 1.48, and for the summer of 1952 only, it was 1.01. This winter's record of 0.72 fish per hour is decidedly less, but much greater than the previous winter.

Angling on other lakes was comparatively light, and of little consequence this winter.

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Rose, E. T. "Winter Fishing in Iowa Lakes", Quarterly Seminar Report 1, March, 1951.

Rose, E. T. "Winter Fishing in Iowa Lakes", Quarterly Seminar Report 7, March, 1952.

FOOD OF BIGMOUTH BUFFALO (*ICTIOBUS CYPRINELLA*) IN NORTHWEST IOWA LAKES

By Tom Moen

Introduction

Bigmouth buffalo (hereafter referred to as buffalo) have been removed from Iowa lakes as undesirable and obnoxious fish since the early nineteen hundreds. Harlan and Speaker (1951) state that nearly a half million pounds are removed from the inland waters of the state each year by the State Conservation Commission. In spite of the apparent abundance and commercial importance of this largest member of the sucker family, there is relatively little specific information concerning the food of this species. In fact all statements in regard to the food of buffalo have been general in nature and apparently founded on the casual observations of a few fish. Forbes and Richardson (1920) examined seventeen specimens with results as follows: "About a third of the food of seventeen specimens consisted of algae, seeds of aquatic plants and distillery slops....,. Of the remaining two-thirds, nearly half consisted of *Entomostraca*, and more than half of aquatic insects, very largely *Chironous* larvae and the larvae of day-flies." Everman and Clark (1920) examined one buffalo from Lake Maxinkukee, finding, "Its stomach filled to distention with *chironomus* larvae and the remains of algae, the latter so disgested as to be incapable of

identification." Eddy and Surber (1947) state that buffalo feed largely on molluscs, insect larvae and vegetation. These and similar statements have led to the assumption that buffalo are primarily bottom feeders and thus not too far removed from carp in their feeding habits. Data from the present study does not bear out this assumption.

Methods and Procedure

Methods and procedure used in this study are similar to those employed in the author's study of the food of carp, Moen (1951). Fish to be examined were collected by several methods, including seines, gillnets and traps with drag seines operated by the rough fish removal crews contributing the majority of the fish. All fish were returned to the lab where routine data was recorded. All stomachs were either examined fresh or preserved in formalin.

Inasmuch as the digestive tract of buffalo is one continuous tube, the entire tract was considered as the stomach. The contents of each stomach were measured to the nearest one-tenth of a cubic centimeter. No volumes were recorded on young fish. All volumes were measured while the material was moist or slightly wet. Due to the fact that most of the food items were comparatively small, a water displacement method was not satisfactory.

After volumeteric measurement was completed the contents were put into a beaker and thoroughly mixed. If

the total volume was greater than ten cubic centimeters, a ten percent sample was removed for detailed study, the remaining portion was examined less critically. Water was then added to obtain a good separation of the food items. This mixture was placed in several petri dishes and examined under a binocular microscope.

After the items identified were recorded, another examination was made to estimate the percentage of total volume represented by each item. These percentages were then converted to volumes. Anything less than one-tenth of a cubic centimeter was recorded as a trace. Identifications were carried as far as could be readily accomplished but in the following discussion and in the tables, the material has been lumped by orders and larger groups.

The data from the analyses of 259 stomachs (184 containing food) taken during the period of 1946-1953, are separated by season (where possible) and expressed as percentages of total volume and as percentages of frequencies of occurence for each of seven lakes (Appendix tables 1, 2, and 3). The fish were also divided into young and adults.

Discussion of Food Consumed

Although buffalo have been commonly thought of as bottom feeders, the data from this study indicate that

they are predominately plankton feeders, taking principally small crustaceans (Entomostracans). Insect larvae, although taken frequently, seldom made up more than one percent of the volume, with midge larvae the principal insect found in buffalo stomachs. Among the other animals found were Rotifers and Hydrachnids, but neither group contributed heavily to the volume or occurence.

Plant material in the food of buffalo was predominately bluegreen algae. Bluegreen algae reached a maximum of 51 percent of the volume in the food of two buffalo from Spirit Lake, but seldom exceeded 10 percent. Microcystis appeared to be the most common algae taken. Aphanizomenon may have been equally important in some lakes but the fact that flakes of this bluegreen are easily reduced to extremely small filaments it may have escaped notice in some cases. Diatoms occurred occasionally but always contributed less than one percent of the volume. Plant debris occurred frequently during the summer months but did not exceed one percent of the volume except in lakes having high populations of bottom feeding fish and a high turbidity.

A total of 56 buffalo stomachs from three lakes were collected during the winter or ice covered period. Forty-three percent of these stomachs contained food as compared

to 80 percent containing food during the open water period. Entomostracans made up 100 percent of the volume of food organisms with a trace of bluegreen algae noted in one stomach.

Supplementry Data

During the summer of 1940 the author examined 48 buffalo from East Okoboji Lake--thirty-five of these stomachs contained food. These were not detailed analyses and the data is mentioned here only to point out that in each stomach Entomostracans made up 90 to 95 percent of the volume; bluegreen algae and debris of vegetation making up the remainder. A few fragments of molluscs were noted in one stomach.

Numbers of Organisms per Stomach

Although it would be extremely difficult to show competition for such numerous items as zooplanktens, it seems that a count of organisms taken might be at least interesting. During the course of the examinations some 16 stomachs were checked for total number of organisms. Eleven counts were made of stomachs taken in the open water periods and five stomachs taken during the winter period.

Of the eleven stomachs taken during the open water period, two were young fish less than 10 grams in weight; these two fish had taken 1,330 and 2,000 entomostracans

respectively. With volumes of entomostracans ranging from 4 to 24 cubic centimeters the adults had taken from 4,000 to 1,250,000 individual entomostracans, averaging about 200,000. Entomostracans volumes ran from 3 to 6 cubic centimeters per winter stomach; the number of individuals ran from 5,000 to 18,000, averaging 8,600.

An attempt or two was made to correlate plankton counts in Storm Lake with the food found in the stomachs of buffalo but time and space does not permit a discussion here. One thing does seem apparent; they have to strain a lot of water to secure their food.

Food of Smallmouth and Black Buffalo

Although the bigmouth buffalo is the most abundant species in our Northwest Iowa lakes, the author was able to secure the stomachs of one black buffalo and five smallmouth buffalo in April of 1948.

The food of the black buffalo, a 36 pound fish containing 105 cubic centimeters of food, was 70 percent entomostracans, 20 percent chironomid larvae and 10 percent scuds (Hyalella).

The food of the five smallmouth buffalo was composed of 75 percent entomostracans, 20 percent chironomid larvae and 5 percent scuds.

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Appendix Table 1. Food of bigmouth buffalo from East Okoboji, expressed as percentages of total volume of food organisms (where volumes were taken) and percentages of frequencies of occurrence.

Season and Maturity	Summer - Adults				Summer - Young		Winter Adult	
Date of Collection	April-May 1946	July 1947	August 1947	April 1953	June 1951	July 1951	March 1948	
Number of Stomachs taken	18	7	3	10	25	5	1	
Number of stomachs containing food	14	6	3	9	25	5	1	
Percent of stomachs containing food	77	86	100	90	100	100	100	
Total volume of food in c.c.	No Vol. taken	123.5	70.0	49.5	not taken	not taken	30.0	
Weight (lbs.) mean or gram range	3.0 1.9 - 4.6	4.6 1.3 - 8.2	4.7 3.8 - 5.2	1.5 1.3 - 1.7	one inch	1.0 gr. 0.5 - 1.5	6.5	
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
	Vol. Occ.	Vol. Occ.	Vol. Occ.	Vol. Occ.	Vol. Occ.	Vol. Occ.	Vol. Occ.	
ANIMAL	100	92 100	99 100	100 100	100	100	100 100	
Insects		T 16	1 67		48			
Diptera		T 16	1 67		48			
Crustacea	100	91 100	98 100	100 100	94	100	100 100	
Entomostraca	100	91 100	98 100	100 100	94	100	100 100	
Cladocera	100	78 100	84 100	82 100	84	100	66 100	
Copepoda	57	13 50	14 100	18 100	60	80	33 100	
Ostracoda					8	40		
Rotifera		T 16						
Hydracarina					4			
PLANT	7	8 83	1 100		10	80		
Algae(blue-green)	7	7 83	T 100		10	40		
Diatoms		T 16			4			
Debris		1 83	1 33			60		

Appendix Table 2. Food of bigmouth buffalo from Storm Lake, expressed as percentages of total volume of food items (where volumes were taken) and as percentages of frequencies of occurrence.

Season	Summer (Open water)								Winter			
Maturity	Adults				Young				Adults			
Date of Collection	June 1948		July 1951		July 1951		March 1953		Feb. 1948		Feb. 1952	
Number of stomachs taken	3		12		11		28		34		17	
Number of stomachs containing food	3		11		11		0		20		3	
Percent of stomachs containing food	100		92		100		0		58		18	
Total Volume of food (cc)	22.0		145.5		Not taken		0		69.8		14.5	
Weight (lbs.) and grams--mean range	5.2 lb 2.7 - 6.7		5.6 lb 1.0 - 10.0		10.5 gram 1.5 - 61.0		0.8 lb 0.5 - 1.0		0.9 - 2.0		5.0 1.7 - 8.0	
	Percent		Percent		Percent		Percent		Percent		Percent	
	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.
ANIMAL	100	100	100	100		100			100	100	100	100
Insects			34	36		45						
Hemiptera			T	36								
Trichoptera			2	27								
Diptera			32	27		45						
Crustacea	100	100	66	100		91			100	100	100	100
Entomostraca	100	100	66	100		91			100	100	100	100
Cladocera	89	100	41	100		82			81	100	33	33
Copepoda	11	100	25	100		45			18	100	64	100
Ostracada			T	9		9			1	27	3	33
Malacostraca						9						
Hyalella						9						
Rotifera						9						
Hydrachinidae			T	9								
PLANT						18						
Algae (blue-green)						18						

Appendix Table 3. Food of bigmouth buffalo from several Iowa lakes, expressed as percentages of total volume of food items (where volumes were taken) and as percentages of frequencies of occurrence.

Lake	Silver Lake (D.Co.)				Spirit Lake				Little Spirit L.		Tuttle Lake		Iowa Lake	
Date of collection	July 1946		Sept. 1948		June 1948		Feb. 1949		July 1947		Sept. 1947		July 1951	
Number of stomachs taken	23		16		3		4		8		16		15	
Number of stomachs containing food	20		16		2		0		8		15		15	
Percent of stomachs containing food	87		100		66		0		100		94		100	
Total volume of food (c.c.)	171.5		229.5		75.0		0		139.5		158.0		Not taken	
Weight mean	2.3 lb.		3.9		9.3 lb.		2.8 lb.		1.3 lb.		1.5 lb.		6.0 grams	
Weight range	1.4 -- 6.1		1.0 -- 6.4		4.7 -- 14.0		2.5 -- 3.2		0.7 -- 1.6		1.2 - 2.8		5.0 -- 7.0	
	Percent		Percent		Percent		Percent		Percent		Percent		Percent	
	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.	Occ.
ANIMAL	100	100	77	100	49	100			89	100	38	93		94
Insecta	1	5	T	12										27
Hemiptera	T	5	T	6										
Trichoptera			T	6										
Diptera	1	5												27
Crustacea	99	100	77	100	49	100			89	100	38	93		94
Entomostraca	99	100	77	100	49	100			89	100	38	93		94
Cladocera	89	80	75	100	25	100			88	100	38	93		94
Copepoda	10	40	2	50	24	100			1	87	5	80		
Ostracada	T	5												
PLANT			23	100	51	100			11	100	62	93		60
Algae(bluegreen)			23	100	51	100			6	75	11	93		60
Diatoms			T	31					T	12				
Debris									5	100	51	86		

RESULTS OF WINTER PHEASANT COUNTS
OBSERVED SEX RATIOS

By Richard Nomsen

Winter pheasant counts were conducted again this year to determine the sex ratio of our past season pheasant population. Results of this survey will be used to help determine the Spring population index.

The procedure for the Conservation Officers sight record project was changed somewhat to try and increase the accuracy of the count. In previous years, all pheasants were counted during a six weeks period regardless of weather and cover conditions. Mild thawing weather during the count greatly reduced the number of birds seen and probably affected the sex ratio. Hens are much more difficult to see unless there is a complete snow cover.

This year, Officers were requested to make counts only when the snow cover was complete. The count was also started January 1 instead of January 16 and continued through February. Reports were made every two weeks.

General weather conditions were more favorable this year. Officers reported a total of 74,941 birds in the six agricultural districts in the Northern two-thirds of the State. All birds reported from the Southern one third of Iowa were grouped to determine the observed sex ratio for the short season zone. A total of 1086 hens and 552 cocks were reported for a sex ratio of 2.0 hens per cock.

The remainder of this report will consider only the Northern six districts.

Table 1 lists the total number of cocks and hens reported during each two week period. The sex ratio remained at 2.2 hens per cock until the last half of February when it changed to 2.4. The average for the complete count was 2.2 hens per cock.

Table 1

Birds Reported and Sex Ratio
for Each Period
Officers Count - North Six Districts

Period	Hens	Cocks	Total	Sex Ratio
Jan.1-15	15,708	7,313	23,021	2.2
Jan.16-31	17,136	7,666	24,802	2.2
Feb.1-15	10,483	4,838	15,321	2.2
Feb.16-28	8,295	3,502	11,797	2.4
Totals	51,622	23,319	74,941	2.2

The number of birds reported from the primary pheasant range in North West and North Central Iowa were of course much higher than for the other districts. Of total birds reported, 77% were recorded in these two districts. The sex ratios for districts 1 and 2 dropped from 2.7 and 3.0 hens per cock to 2.0 and 2.1 respectively. The heavy snow cover during the last three weeks of the season made hunting conditions difficult over the primary pheasant range. Officers in this area remarked about the noticeable increase in the percentage

of roosters remaining in the population.

Sex ratio figures for districts 3,4,5, and 6 show an increase in the number of hens per cock, indicating a more favorable harvest of cocks than in district one and two. Table 2 lists the sex ratios for each district and compares results with previous winter counts.

Table 2

Observed Sex Ratios
Hens Per Cock

District	1951	1952	1953
1 North West	2.4	2.7	2.0
2 North Central	3.1	3.0	2.1
3 North East	3.5	2.3	2.7
4 West Central	2.2	2.0	2.5
5 Central	2.8	2.9	3.1
6 East Central	3.5	2.1	3.2
7 Northern			
Six Districts	2.9	2.7	2.2

Results of this count indicate that about 55% of the available roosters were shot during the 1952 season. This compares with 63% and 65% respectively for the 1951 and 1950 seasons. The estimates for the 1951 and 1950 seasons were incorrectly reported as 73% and 75% in the 1952 April Seminar.

Rural Mail Carriers Count
Winter 1953

Iowa's cooperating Rural Mail Carriers made their winter survey during the last week in January. A total of 92,723 pheasants were reported by 415 carriers in the first six districts. About 66,000 of these were checked

in districts one and two.

The carriers in the Southern three districts reported 796 hens and 494 cocks for a sex ratio of 1.6 hens per cock. Besides the lower population, conditions are generally quite difficult to obtain a large sample in Southern Iowa. Table 3 compares the total number of birds seen in each of the Northern six districts.

Table 3

Total Pheasants Reported
Rural Mail Carriers - 1953

District	Hens	Cocks	Total
1 North West	21,930	9,119	31,049
2 North Central	25,521	9,978	35,499
3 North East	8,340	2,792	11,132
4 West Central	4,757	2,200	6,957
5 Central	4,583	1,754	6,337
6 East Central	1,271	478	1,749
7 Northern Six Districts	66,402	26,321	92,723

The results of this count also show fewer hens per cock in our present population. The average for all birds reported was 2.5 hens per cock compared with 2.6 in 1952. This does not mean that we have a lower population of hens, merely that the ratio of hens to cocks is smaller. Population data will be collected during our Spring counts.

Table 4 lists the results of this survey.

Table 4
Observed Sex Ratios From
Carriers Count

District	1951	1952	1953
1 North West	2.4	2.6	2.4
2 North Central	2.5	2.7	2.6
3 North East	3.1	3.2	3.0
4 West Central	1.5	1.6	2.2
5 Central	2.4	2.1	2.6
6 East Central	3.2	2.8	2.7
7 Northern Six Districts	2.7	2.6	2.5

AGE OF IOWA QUAIL 1952

By M. E. Stempel

Wings from quail killed during the hunting season have been collected during past years. From data from the wings comes information on the hatch of the birds. The hatching pattern is compared to spring and summer weather and to the summer calling of male quail.

Facts gathered in 1950, 1951, and 1952 indicate that a long period of calling activity accompanies a good hatch of quail. Hence, by August 15, we have a definite indication of the size of the quail crop we can expect.

Method of securing information

Letters are mailed to the conservation officers before the opening of the quail season. New officers are contacted to make certain that the work is understood so that an explanation can be made to the hunters. Interested persons are given envelopes in which wings can be kept from one day's hunt. Date of the kill is recorded on the envelope.

Method of determining age

Old quail have dark grey upper wing coverts, the young have buff tips on the upper covert feathers. Days age of young quail is learned by measuring the length of growing primary wing feathers. This year, instead of

measuring the feather, the wing was classified as to age by a method suggested by Petrides and Nestler. A single growing feather is classified as being 1/4, 1/2, 3/4 or full grown.

Results from statewide collection of wings

A total of 1443 wings were collected during the 1952 quail hunting season. Of the total, 1249 wings were of quail hatched in 1952, adults hatched a year or more ago numbered 194. 87% of the quail were young, this is unusually high, and a high per cent of young usually is associated with a poor hunting season. 1952 was a good hunting season.

Results of collection of dated quail wings

Dated wing collections were made in the following counties; Davis, Decatur, Jasper, Keokuk, Lee, Lucas, Poweshiek, Ringgold, Van Buren, Wapello and Wayne.

Dated wings showed the young to be in the proportion of 89% while the total collection from all sources contained 87% young bird wings.

One possible reason for this difference would be that the per cent of young will decrease with the advance of the season, and those collecting wings were asked to make most of the collection during the fore part of the season if the date of the collection was to be recorded. Undated wings were collected at any opportunity.

The total number of wings sent in dated packages was 468. The sex of the quail was given in some cases. Of these, 52% were females. During the 1951 season a sample showed 53% males. Early in the fall it has been observed that an entire bag of quail may consist of birds of one sex.

Hatch periods

The hatch of quail took place in the following order beginning with the fore part of June. June 1-15, one per cent of the hatch; June 16-30, 13% of the hatch; July 1-15, 13%, July 16-31, 21%; August 1-15, 16%; August 16-31, 20%; Sept. 1-15, 10%; Sept. 16-30, 3%; Oct. 1-15, none; Oct. 16-31, five tenths of one per cent.

Age of Quail

During the month of November 46% of the quail killed were over 150 days old, 39% were up to 120 days age, and 13% were 121 to 130 days old. After December the first to December 15, nineteen per cent of the birds were up to 120 days old, 10% were 131 to 150 days old, and 70% were 150 days old or older.

Table of the Age of Quail
Birds Killed During the Month of November
1950-1951-1952

Days age of Quail		1 to 120	121 to 130	131 to 140	Mature or over 150 days age
	1950	39	14	10	37
% of	1951	59	21	6	12
cases	1952	40	11	0	48

The year 1950 had a late growing season, 1951 had a still later season and 1952 had an early growing season. 1950 was a fairly good hunting year, 1951 was a poor hunting year for quail, and 1952 was generally a good quail hunting season.

In a small sample of birds killed November 1 to November 4, 1952, twenty per cent of the birds taken were over 150 days old. It is not known how nearly this represents the age of the population because some hunters are reluctant to kill quail that are not mature in size.

For the entire season, 1952, November 1, through December 15, 54% of the young quail were over 150 days of age. During the month of November, 48% of the quail wings turned in were from quail that had reached the 150 day stage.

Young-Old Ratio of Iowa Quail 1952

Age of quail in Iowa, and hatching dates as indicated by a sample of quail wings collected during the 1952 quail hunting season.

County	Young	Adult	County	Young	Adult
Adair	25	4	Jefferson	139	23
Adams	13	9	Johnson		
Allamakee			Jones		
Appanoose & Monroe	163	27	Keokuk		
Benton			Lee	152	27
Blackhawk			Linn	5	1
Buchanan			Louisa		
Cedar			Lucas	138	17
Clarke	21	4	Madison	64	14
Clayton			Mahaska	9	
Clinton	5		Marion	8	2
Dallas			Marshall		
Davis	63	6	Monroe (See App)		
Decatur	71	9	Muscatine	4	
Delaware			Page		
Des Moines			Polk	133	26
Dubuque			Poweshiek	19	3
Fayette			Ringgold	9	2
Guthrie	3		Scott	4	1
Henry			Tama		
Iowa			Taylor		
Jackson	4		Union		
Jasper	6				

Summary

1. 1443 quail wings were collected during the 1952 hunting season.
2. 87% of wings were from young in the collection made of undated wings over the entire quail range.
3. 89% of wings from dated kills were quail hatched in the summer of 1952.
4. The peak of the 1952 quail hatch was early in July.
5. In November 1952 fully grown young quail made up 48% of the birds killed; in 1951 12% of the bag was mature size young; and in 1950 37% of the bag consisted of the mature size young quail.

SEX AND AGE RATIOS OF SQUIRRELS IN THE BAG AND HUNTER-SUCCESS AS REPORTED BY HUNTERS, 1952.

By Glen C. Sanderson

The squirrel project initiated in 1950 with the aid of hunter-cooperators was continued in 1952. As in the previous year, squirrel hunters furnished the bulk of the information contained in this report.

More than 200 hunters contacted in 1951, plus 31 names they furnished, additional names furnished by some conservation officers, and employees of the Fish and Game Commission formed the list of prospective 1952 cooperators. Approximately 525 hunters were contacted last fall (See Table 1 below).

Table 1.--Squirrel hunters contacted in 1952.

Number of hunters contacted	525
Number of hunters reporting	60
Percentage reporting	11.4
Number of hunters saving leg bones	27
Number of usable leg bones saved	587
Number of new names furnished by hunters	22

Prospective hunter-cooperators were contacted the week prior to the opening of the squirrel hunting season last fall. They were mailed letters, forms, and instructions similar to the ones used in 1950 (Sanderson, 1950) and in addition each received a mimeographed summary of the results of the 1951 project.

This report includes the results of the 1952 project including the hunter's ideas on abundance of squirrels, hunter habits and kill during the first, middle, and last

parts of the season and for the entire season, hunter success, sex ratios for both fox and gray squirrels, and the age ratios of fox and gray squirrels as determined by leg bones furnished by the cooperators.

RESULTS

With a larger number of hunters contacted in 1952 than in 1951 the percentage return was smaller than it was in 1952 even though each man was asked to return the form whether or not he did any hunting. Reports were received from 60 of the 525 hunters contacted or slightly more than a 11 per cent return (See Table 1). Although the percentage return was smaller in 1952 than it was in 1951, the total number of returns was slightly higher and nearly twice as many leg bones were saved in 1952 as in 1951. Unfortunately, in spite of repeated warnings as to which bones we wanted and how long to cut them, there 19 humeri and 81 feet cut at the "ankle" instead of the "elbow" that could not be used. Three more bones had been shattered by shot so that it was impossible to determine the age of the squirrels they came from but this was not the fault of the cooperators.

Population--Forty-seven hunters replied to the question "Do you think there are MORE or FEWER squirrels than there were last year?". Nearly 60 per cent answered more, while less than 20 per cent said there were fewer,

and slightly more than 20 per cent said there were the same number as last year (See Table 2).

Table 2.--Hunter's replies as to whether there were more or fewer squirrels than there were last year.

Number of hunters reporting	60
Number of hunters answering the question	47
Number who said MORE squirrels than last year	28(59.6%)
Number who said FEWER squirrels than last year	8(17.0%
Number who said SAME number of squirrels as last year	11(23.4%)

The question asked was "Do you think there are more or fewer squirrels than there were last year?"

In 1951, 53.8 per cent answered more, 30.8 per cent answered fewer, and 15.4 per cent thought there were the same number as in 1950 (Sanderson, 1952).

Kill Data--In order to determine the habits of squirrel hunters, their hunting trips were separated into those made during the first one-third (September 15-October 4), middle one-third (October 5-October 25), and last one-third (October 26-November 15) of the season. Table 3 reveals that 51.3 per cent of the trips were made during the first one-third of the season, 25.1 per cent during the middle one-third, and 23.6 per cent during the last one-third of the season. The table further reveals that the hunting habits have been similar during the three season, although in 1951 there was a slight decline over 1950 in the early season hunting and a corresponding increase during the latter part of the season. This is perhaps explained by the more difficult early hunting in 1951 caused by the heavy leaf cover which was followed by continued good hunting success

during the latter part of the season. This is perhaps explained by the more difficult early hunting in 1951 caused by the heavy leaf cover which was followed by continued good hunting success during the latter part of the season (Sanderson, 1952).

The second part of the table indicated that the number of squirrels bagged during these three periods for all three seasons, corresponds closely to the number of trips made during the particular period. A slight exception to this is the decreased hunting success during the first part of the 1951 season which was followed by a slight increase in the hunting success during the middle and last parts of the season.

Table 3.--Hunter habits and kill during the first, middle, and last part of the open season--1950, 1951, and 1952.

	1950	1951	1952
Number hunts, 1st 1/3 of season	294(55.5%)	137(52.7%)	209(51.3%)
Number hunts, 2nd 1/3 of season	155(29.4%)	73(28.1%)	102(25.1%)
Number hunts, last 1/3 of season	80(15.1%)	50(19.2%)	96(23.6%)
Total no. hunts entire season[1]	530	260	407
Number bagged, 1st 1/3	1,025(54.7%)	468(48.3%)	734(53.7%)
Number bagged, 2nd 1/3	548(29.2%)	324(33.4%)	290(21.2%)
Number bagged, last 1/3	302(16.1%)	177(18.3%)	342(25.1%)
Number bagged, entire season[2]	1,875	969	1,336

(1) As used here a hunt means a trip by a hunting party whether it had one or a number of hunters.
(2) Includes both fox and gray squirrels.

Table 4 reveals that during the entire season an average of 1.3 squirrels was bagged for each hour a party spent hunting. This is the same as was reported for the 1950 season (Sanderson, 1951), but is 0.4 squirrel per hour below the average of 1.7 squirrels per hour reported

for 1951 (Sanderson, 1952). In 1952 as in 1950, hunting success was better early in the season than it was later, although the opposite was true for the 1951 season. During the 1951 season the average number of squirrels seen per hour remained fairly constant for the various periods; however, table 4 shows that during the 1952 season the total number seen per hour was highest early in the season. Perhaps the extremely dry weather, which got drier as the season progressed, during the 1952 season made it more and more difficult to see squirrels.

An average of 3.2 squirrels was bagged by each party each time they went hunting compared to an average of 3.5 and 3.7 for the 1950 and 1951 seasons respectively.

It is believed that the lower average hunting success in 1952 as compared to 1951 was caused by weather conditions (extremely dry) unfavorable to hunting in 1952. Thus the reduced average hunting success in 1952 is not thought to reflect a lower population level than in 1951. All reports indicate that the 1952 squirrel population level was as high or slightly higher than it was in 1951. Indications are that there was a good "carry over" of squirrels after the 1952 season closed.

Table 4.--Hunter success, number of hunters per party, hours hunted, and number of hunting trips made during the first, middle, and last part of the open season.

	Sept.15-Oct.4	Oct.5-Oct.25	Oct.26-Nov.15	Sept.15-Nov. 15
Total number squirrels bagged[1]	716	275	315	1,306
Av. No. bagged per party per hour	1.5	1.0	1.2	1.3
Av. no. bagged per party per trip	3.4	2.7	3.3	3.2
Total number crippled	37	16	25	78
Av. no. crippled per party per hour	0.08	0.06	0.10	0.08
Total no. seen but not bagged or crippled	791	317	330	1,438
Av. no. seen but not bagged or crippled per party per hour	1.6	1.1	1.3	1.4
Av. no. seen per party per hour	3.2	2.2	2.5	2.8
Av. no. seen per party per trip	7.4	6.0	7.0	6.9
Av. no. hunters per party	(321)[2] 1.5	(152) 1.5	(156) 1.6	(629) 1.5
Total number of hunts reported	209	102	96	407
Av. no. trips per hunter reporting[3]	---	---	---	8.3
Total no. hours hunted (party hours)	482	278	264	1,024
Av. no. hours hunted per party per trip	2.3	2.7	2.8	2.5

1 Both fox and gray squirrels.
2 Numbers in parentheses indicate number of hunters making a trip.
3 Those who hunted at least one time.

The average number of hunters per party for the season was 1.5 with practically no change in size throughout the season. The reporting hunters spent an average of 2.5 hours per trip compared to 2.2 hours in 1951. Slightly longer trips were made toward the end of the season (Table 4) instead of slightly shorter trips as during the previous year (Sanderson, 1952). The cooperating hunters made a total of 407 trips for an average of 8.3 trips per season for each hunter. Both the larger number of trips per hunter per season, and the longer average hunting trips made in 1952 as compared to 1951 probably reflect the slightly poorer hunting success in 1952 as compared to 1951.

Sex-Ratio__The reports reveal 569 (46.3%) females among 1,230 fox squirrels reported as to sex over the entire state. To put it another way, there were 116 males per 100 females in the fox squirrels bagged in Iowa last year (Table 5). This may be compared to 43.4 per cent females reported for 1950 (Sanderson, 1951), and 45.7 per cent females reported in 1951 (Sanderson, 1952).

There were 45 females (46.4%) among 97 gray squirrels reported as to sex. This is also 116 males per 100 females for the gray squirrels (Table 5). This compares to 47.8 and 46.8 per cent females in the 1951 and 1950 gray squirrel harvests respectively.

Table 5.--Sex ratio, age ratio[1], and percentage of fox and gray squirrels seen and in the bag according to agricultural areas.

AREA	I	II	III	IV	V	VI	VII	VIII	IX	Total
FOX										
No. sexed	109	117	205	209	152	17	0	332	89	1,230
No. males	60	59	114	107	79	11	0	183	48	661
No. females	49	58	91	102	73	6	0	149	41	569
% females	45.0	49.6	44.4	48.8	48.0	---	0	44.9	46.1	46.3
M per 100 F	122	102	105	108	---	---	0	123	117	116
GRAY										
No. sexed	0	18	57	0	0	5	0	6	11	97
No. males	0	7	33	0	0	3	0	2	7	52
No. females	0	11	24	0	0	2	0	4	4	45
% females	---	---	---	---	---	---	0	---	---	46.4
M per 100 F	---	---	---	---	---	---	0	---	---	116
FOX										
No. aged	230	66	23	47	34	14	0	136	16	566
No. Ads.	95	27	10	24	16	5	0	63	7	247
No. Juvs.	135	39	13	23	18	9	0	73	9	319
% Juvs.	58.7	59.1	56.5	48.9	52.9	---	0	53.7	---	56.4
Juvs/Ad F[2]	3.2	2.9	3.0	2.0	2.3	---	0	2.6	---	2.8
GRAY										
No. aged	0	9	11	0	0	0	0	0	1	21
No. Ads.	0	6	6	0	0	0	0	0	1	13
No. Juvs.	0	3	5	0	0	0	0	0	0	8
% Juvs.	---	---	---	---	---	---	0	---	---	38.1
Juvs/Ad F[2]	---	---	---	---	---	---	0	---	---	1.3
Total kill reported of both species	112[3]	134	288	209	150	22	0	350	124	1,389
No. fox squirrels in the reported kill	109	117	228	209	150	17	0	347	106	1,283
% fox squirrels in the reported kill	97.3	87.3	79.2	100	100	77.3	0	99.1	84.5	92.6
No. gray squirrels in the reported kill	0	17	60	0	0	5	0	3	18	103
% gray squirrels in the reported kill	0	12.7	20.8	0	0	22.7	0	0.9	14.5	7.4
Total No. squirrels seen--both species	264	249	511	454	329	84	0	723	326	2,940
Number fox sqirrels seen	261	227	371	454	329	54	0	708	243	2,647
% fox squirrels seen	98.9	91.2	72.6	100	100	64.3	0	97.3	74.5	91.1
Number gray squirrels seen	0	22	140	0	0	30	0	15	83	290
% gray squirrels seen	0	8.8	27.4	0	0	35.7	0	2.1	25.5	9.9

1 Determinted by leg bone criterion.
2 Based on sex ratios reported by hunters (this table).
3 Three red squirrels

The percentage of females killed during the first, second and last parts of the season fluctuates for fox squirrels (Table 6). During the past two seasons the percentage of female fox squirrels killed has increased during the middle part of the season and then declined during the last part of the season to below what it was for the first part of the season.

Age Ratio-Leg bones saved by hunters reveal 319 (56.4%) juveniles among 566 fox squirrels bagged for the entire state (Table 5). This is only slightly lower than the 57.2% juveniles reported for the 1950 season (Sanderson, 1951), and is somewhat higher than the 52.5 per cent juveniles reported for the 1951 season (Sanderson, 1952). Perhaps the relatively lower hunting success during the 1950 and 1952 seasons compared to the 1951 season had some effect on these age ratios. It may be that the young squirrels are bagged more easily than adults, thus a higher percentage of them would be killed first. During the 1951 season when hunting success improved as the season progressed there may have been more adults killed late in the season with continued good hunting success bringing the percentage of juveniles in the bag down below what it was for the 1950 and 1952 seasons when hunting success decreased as the season progressed.

Table 5 also reveals 2.8 juveniles per adult female fox squirrel bagged compared to 2.4 reported for the previous year. These figures are computed using the sex ratios reported by the hunters.

There were eight (38.1%) juveniles among 21 gray squirrels reported over the entire state. These numbers are too small to compute an age ratio.

Species Composition-Fox squirrels predominate in the hunter's bag in all sections of Iowa. Over the entire state fox squirrels comprised 92.6 per cent of the bag and gray squirrels only 7.4 per cent (Table 5). In 1950 fox squirrels accounted for 98.1 per cent of the total (Sanderson, 1951) and in 1951, 87.2 per cent (Sanderson, 1952).

There should be an explanation for the lack of gray squirrel data obtained during the 1952 season. It seems probably that the grays were even more difficult than usual to kill during the extremely dry, noisy conditions which were present in the timber during most of the 1952 squirrel season. Table 5 does show that grays may be somewhat more difficult to bag than fox squirrels but according to these figures the difference is not large enough to be conclusive. For example, gray squirrels contributed 7.4 per cent to the total bag but in the total number of squirrels seen, they accounted for 9.9 per cent--

only a slightly higher percentage. Of course, it is probably true that during the dry conditions gray squirrels were both harder to see and harder to bag than during normal conditions. Once seen, they appeared to be no more difficult than usual to bag.

Type of Gun-The .22 rifle is still the most popular choice of Iowa hunters for squirrel hunting. Thirty-two (64.0%) of the 50 hunters who replied to the question regarding type of gun used, chose the .22 rifle. Many of the hunters use scopes on their .22's. One hunter used a .25 rifle, while five used 410 shotguns, one used a 12 gauge shotgun, one used either a 20 or a 12 gauge shotgun, three used 410-.22 over and under combinations, four used a combination of shotgun and rifle, one used a pistol and shotgun, one a .22 pistol and .22 rifle and one a .22 rifle and 20 and 410 gauge shotguns.

Table 6.--Sex ratio of squirrels bagged during the first, middle, and last part of the open season.

	FOX				GRAY			
	MM	FF	%FF	MM/100FF	MM	FF	%FF	MM/100FF
Sept. 15-Oct. 4	336	296	46.8	114	30	19	---	---
Oct. 5-Oct. 25	136	131	49.1	104	7	10	---	---
Oct. 26-Nov. 15	182	135	42.6	135	15	15	---	---
Sept. 15-Nov. 15	654	562	46.2	116	52	44	45.8	118

SUMMARY

1. The squirrel project enlisting the cooperation of squirrel hunters which was initiated in the fall of 1950 was continued in 1952.

2. Of approximately 525 hunters contacted, 60 (11.4%) replied.

3. Nearly 60 per cent think that there were more squirrels in 1952 than there were in 1951, while 17 per cent think that there were fewer, and more than 23 per cent think that the population was the same in 1952 as it was in 1951.

4 Hunting habits were similar in 1950, 1951, and 1952. Approximately 51 per cent of the hunting was done during the first one-third of the season, 25 per cent during the middle one-third, and 24 per cent during the final one-third in 1952.

5. The number of squirrels bagged in each part of the season corresponds closely to the amount of hunting done in the same part of the season.

6. An average of 1.3 squirrels was bagged per party per hour compared to an average of 1.7 in 1951, and 1.3 in 1950 respectively. It is not thought that the lower average hunting success in 1952 reflects a lower population level for last fall.

7. An average of 3.2 squirrels was bagged per party per hunting trip compared to an average of 3.5 and 3.7 in 1950 and 1951 respectively.

8. Of 1,230 fox squirrels reported as to sex, 569 were females or 116 males per 100 females (46.3% females). In 1950 43.4 per cent and in 1951 45.7 per cent of the fox squirrels bagged were females.

9. Of 97 gray squirrels reported as to sex, 45 were females or 116 males per 100 females (46.4% females). In 1950 and 1951 the figures were 46.8 and 47.8 per cents respectively.

10. Leg bones reveal 56.4 per cent juveniles among 566 fox squirrels aged compared to 57.2 per cent in 1950 and 52.5 per cent in 1952.

11. Leg bones reveal 38.1 per cent juveniles among 21 gray squirrels bagged, but the sample is not large enough to be significant.

12. Fox squirrels comprised 92.6 per cent of the squirrels bagged and 91.1 per cent of the squirrels seen.

13. Nearly two-thirds of the hunters used a .22 rifle for their hunting while the rest used various combinations of shotguns, pistols, and rifles.

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IOWA WATERFOWL SEASON AND REGULATIONS - 1952

By James G. Sieh

The 1952 waterfowl season opened throughout the state on October 8, 1952 and closed December 1, 1952.* Shooting was allowed opening day from noon until one hour before sunset. Each day thereafter the season opened one-half hour before sunrise and closed one hour before sunset.

The bag limit of ducks was four (4) per day; and the possession limit after the first day, eight (8), with only one (1) wood duck in possession at any time.

The bag and possession limit of geese was five (5). Not more than two (2) of the limit could have been Canada geese, their sub-species or white-fronted geese. The entire bag could have been made up of either blue or snow geese or any combination of them.

The bag and possession limit of coot and mudhen was ten (10). There was a daily bag limit of twenty-five (25) on American and red-breasted mergansers, with no possession limit.

There was no open season on wilson or jack snipe, wood cock, grebe, rails (except coot) and gallinules, mourning dove, and swan.

*The 1952 open season was ten (10) days longer than the 1951 season, and opened four days earlier.

The 1948, 1949, 1950, 1951 and 1952 waterfowl seasons and regulations were much the same except for minor changes in opening and closing dates, and in the bag and possession limit of coot. One additional blue or snow goose was added to the bag limit in 1952.

The 1948 waterfowl season opened throughout the state on October 29th and closed on November 27th. The 1949 season opened on October 21st and closed on November 29th. In 1950 the season opened on October 20th and closed November 23rd. The 1951 waterfowl season opened on October 12th and closed on November 25th.

WATERFOWL BAG CHECKS - 1952

The Iowa Conservation Commission requested conservation officers and other field personnel to make waterfowl bag checks during the 1952 open season by completing tally cards. This was the fifth year this program was undertaken to sample the waterfowl harvest in Iowa. Commission personnel checked 6,838 hunters in the field and returned 738 tally cards representing 62 counties in the state (Table I). This by no means indicated all the waterfowl killed in Iowa during the 1952 open season. It does, however, provide a sample of the kill in 1952, and data comparable with that of the 1948, 1949, 1950 and 1951 kill samples. In 1948, 541 cards representing 72 counties were returned; and in 1949

there were 651 cards representing the same number of counties. During the 1950 open season 644 cards represented 71 counties, while in 1951 there were 1050 cards returned representing 77 counties.

The State Conservation Commission has investigated the waterfowl kill in Iowa during each open season since 1948. The number of ducks recorded from the 1952 kill sample was larger than three of the previous four samples, but slightly less than half of the number of ducks sampled in 1951. This study has established the species composition of the total aggregate waterfowl bag taken in Iowa during the open seasons and the percentage of each species taken. In addition, the number of hours required by the average Iowa waterfowl hunter to take a duck or goose has been calculated for each of the five seasons.

In 1952 the total recorded kill sample of 6,289 wildfowl included 16 species of ducks and mergansers. In addition, 109 geese consisting of three identified species and two unidentified specimens represented the smallest kill sample of geese recorded since this study began. (Table II).

Mallards totaled 42.9% of the aggregate kill sample and were represented by 2,698 birds in 1952. In 1951 mallards totaled 53.0% of the kill or 7,354 birds; in

1950 this species represented 50.2% of the kill or 2,344 birds. In 1949 mallards represented 46.3% of the kill sample or 2,735 birds and in 1948 totaled 54.7% of the kill sample representing 3,327 birds. It is obvious that mallards continue to remain the most important species of waterfowl to the Iowa hunter; and that the annual total kill of this species largely determines from a public standpoint a successful or unsuccessful waterfowl season in Iowa.

During the 1952 waterfowl harvest blue-winged teal were again second in numerical importance (810 birds) according to the bag checks and totaled 12.9% of the kill sample. In 1951 this species represented 10.8% of the recorded kill or 1,502 blue-wings. In 1950 this species represented 13.7% of the kill or 637 birds; in 1949, 11.7% of the kill or 691 birds. In 1948 they represented only a small 2.9% of the sample or 174 birds. The blue-winged teal have maintained second position of numerical importance in the 1949, 1950, 1951 and 1952 kill samples when the waterfowl season opened respectively on October 21st, 20th, 12th, and October 8th. In 1948 the waterfowl season opened on October 29th, eight to twenty-one days later than the last four consecutive openings and the blue-winged teal harvest was reduced an average of 9.4% largely because of the late opening date.

Green-winged teal ascended to third place in numerical importance accounting for 11.1% of the kill sample or 697 birds during the 1952 open season. This was the first year that green-winged teal reversed their downward trend from a percentage standpoint in the kill sample. During the 1951 open season this species represented 6.4% of the kill sample or 885 birds; comprised 8.6% or 399 green-wings in 1950; 11.4% of 670 birds in 1949. An unusually large concentration of green-winged teal were present in northwest Iowa at the opening of the 1952 waterfowl season and a larger than normal kill resulted on the opening day. This increased kill on the opening day may have raised the percentage of this species in the kill sample. In future analysis of these data this factor mentioned above should be taken into consideration.

Pintails were in fourth place in numerical importance representing 634 birds and 10.1% of the kill sample in 1952. In 1951 they represented 9.0% of the sample or 1,252 birds; and in 1950 only 6.2% or 291 birds. In 1949 the sample reached 10.9% representing 643 birds; and in 1948 a little less, or 8.9% representing 546 birds. From these data it can be concluded that pintails can be expected to contribute about 9.0% of the kill sample during the open season.

The harvest of lesser scaup increased to 7.5% of the sample or 468 ducks in 1952. In 1951 this species contributed 5.7% of the aggregate kill sample representing 787 birds. In 1950 lesser scaup contributed 7.5% of the sample or 351 birds; 5.4% or 317 birds in 1949; and 7.2% or 439 birds during the 1948 bag check.

Wood ducks reached a five year high in percent of harvest represented by 6.8% of the kill sample or 427 ducks in 1952. In 1951 this species comprised 3.3% of the sample and 464 ducks; 3.2% or 148 birds in 1950; 2.3% or 133 birds in 1949; and 1.9% or 114 Wood ducks in 1948. Waterfowl bag checks have indicated an increased harvest of wood ducks for five consecutive years. It is probable that this indicated greater abundance of wood ducks in the state during the open season and increased hunting pressure applied to this species. The wood duck is an early fall migrant and earlier opening dates have probably increased the total harvest of the species in Iowa during the last five open seasons.

The remaining ten species of ducks and mergansers represented in aggregate only 8.7% of the total kill sample in 1952. In 1951 these same species in aggregate contributed 11.8% in 1951; 10.6% in 1950; 12.0% in 1949; and 11.8% in 1948. None of these ten species of ducks and mergansers exceeded 3.2% of the aggregate during five

years of sampling. It is apparent that there has been little change in the percentages represented in the five kill samples; and that the black duck, gadwall, baldpate, shoveller, redhead, ringnecked duck, canvas-back, goldeneye, bufflehead, ruddy duck, and mergansers comprised but a small percentage of the annual waterfowl harvest in Iowa.

Blue geese comprised only 19.3% of the total goose sample in 1952; 45.6% in 1951; 41.7% in 1950; 51.3% in 1949; and 41.5% in 1948. The kill sample of snow geese and Canada geese was likewise smaller than usual. No white-fronted geese were reported from the 1948, 1951, or 1952 kill samples. Two unidentified geese were reported in 1952.

The average hunter in Iowa bagged one duck in 3.2 hours of hunting in 1952. In 1951 the same average hunter required 1.87 hours of hunting to kill one duck; 4.1 hunting hours were required in 1950; 3.2 hours were required in 1949; and 2.3 hunting hours were required to kill one duck in 1948. The 1952 waterfowl kill sample closely paralleled the 1949 kill sample data indicating the same amount of hunting effort to harvest one duck. On a statewide basis hunting was considered poor in 1952, and in some sections of the state one of the poorest seasons on record. The waterfowl season of 1950 remains the poorest duck hunting season on record considering that 4.1 hunting

hours were required to kill one duck. From the kill per hour standpoint the hunting season of 1951 was the most successful with only 1.9 hunting hours required to kill one duck.

Goose hunting in 1952 on a state-wide basis was the poorest on record requiring the average hunter 18.3 hunting hours afield to kill a goose. In 1951 the average hunter required 52 hunting hours to kill a goose and in 1950 there were 41.1 hunting hours required. In 1949 the same average hunter required only 25.4 hunting hours to kill a goose which in 1948 required 67.6 hours afield. The 1949 open season was by far the most successful on record from the standpoint of goose hunting success.

Hunters who had taken nothing averaged 2.4 hours in the field when checked by conservation personnel in 1952; 2.1 hours in the field in 1951; 3.3 hours in the field in 1950; 2.8 hours in 1949; and 2.2 hours in 1948. Throughout the state 6,838 hunters were checked who had hunted 20,141 hours during the 1952 open season, and 9,955 hunters who had hunted 25,419 hours during the 1951 open season were checked; in 1950 there were 5,170 hunters checked who had hunted 19,132 hours. In 1949 there were 5,862 hunters checked who had hunted 18,802 hours, while in 1948 there were 4,984 duck hunters checked who had hunted 13,926 hours. From 1948 until 1950 the

aggregate kill sample decreased in the total number of waterfowl killed, while the total hours spent by hunters in the field increased. The successful waterfowl season in 1951 reversed the situation, but again in 1952 the harvest was down, and closely paralleled the harvest success of 1949 on a state-wide basis.

Two-man hunting parties have continued to remain the most numerous hunting combination checked. One-man hunting parties run a close second in the number checked during the last five hunting seasons. Duck hunting parties of five or more persons have remained few in number compared with the smaller sized hunting parties checked. This year (1952) there were 1,367 two-man parties checked, 969 one-man parties or solitary hunters tallied, 551 three-man groups, 232 four-man groups, and only 93 parties with five or more hunters checked.

Mallards averaged 49.4% of the kill sample during the last five years or approximately one-half of the total waterfowl harvest in Iowa. Blue-winged teal have maintained second place in numerical importance in the 1949, 1950, 1951, and 1952 kill samples. In 1948 this species represented only 2.9% of the kill sample indicating that blue-wings can be expected to represent about 12% of the aggregate kill sample when the waterfowl season opens on or before October 20th in Iowa. The sample of green-

winged teal had shown a continuous percentage decrease from 1948 through 1951. In 1952, however, green-wings reversed this downward trend and represented 11.1% of the kill sample, and third place in numerical importance. Wood ducks have shown a continuous increase in the percent reported taken in the kill sample since 1948. Wood ducks represented only 1.9% of the sample in 1948, and in 1952 reached 6.8% of the harvest sampled. An increased harvest of any waterfowl species in Iowa suggests that a greater number of the species was present in the state during the open season, or that more hunting pressure was applied to the species in question; or that both of these factors were operating concurrently.

Conservation officers and other field personnel have contributed to the waterfowl program by completing and returning their waterfowl bag checks each year. If waterfowl shooting in the State of Iowa is to be improved, more complete waterfowl bag checks will help and are needed. All conservation personnel are again urged to contribute to this study as generously as possible.

TABLE I

RECAPITULATION OF DUCK KILL BY COUNTY

	Allamakee	Appanoose	Boone	Bremer	Buchanan	Buena Vista	Butler	Calhoun	Carroll	Cedar	Cerro Gordo	Chickasaw	Clay	Clayton
Total Number Hunters Checked:	227	41	23	559	129	22	14	198	25	5	360	26	731	135
Total Number of Hours Hunted	687	122	58	1269	308	313	13	167	48	21	732	51	2151	163
None Taken:														
Number of Hunters	52	14		322	69	83	7	155	22		77	5	253	51
Hours Hunted	124	40		647	128	72	5	117	41		120	12	631	57
Mallard	120	2	15	91	30	151	4	37	2	8	150	23	265	26
Black Duck	9										7			6
Gadwall	2			3		2					10		8	2
Baldpate	18			1		11					8		4	10
Pintail	16	5	3	18		31		2			48	5	149	4
G..W. Teal		1	5	30	8	55	1	2			40	2	50	
B. W. Teal	28	3		3		23	1	21		3	99	4	107	12
Shoveller	2			4	1	9		1			33		18	
Wood Duck	43			20	4	8		5		2	30	8	13	12
Redhead			1								21		5	
Ring-necked				1										
Canvas-back	1	11						1			20		5	
Lesser Scaup	20	18	4	13	54				1		82		20	19
Golden-eye	2										2			
Bufflehead	1			1							1			1
Ruddy Duck	8					8					8		5	1
Merganser			1	7	2									
TOTAL DUCKS	270	40	29	192	99	298	6	69	3	13	559	42	649	93
Canada Geese	5		2								4			
Blue Geese		1			5						2			
Snow Geese						1					3			
W. F. Geese														
Other Geese											2			
TOTAL GEESE	5	1	2		5	1					11			

TABLE I

RECAPITUALTION OF DUCK KILL BY COUNTY

	Clinton	Dallas	Davis	Decatur	Delaware	Des Moines	Dickinson	Dubuque	Emmet	Fremont	Greene	Grundy	Guthrie
Total Number Hunters Checked:	174	17	22	12	12	163	67	53	241	36	85	26	100
Total Number of Hours Hunted	539	34	37	20	19	248	85	351	483	87	108	94	338
None Taken:													
Number of Hunters	35	6	8		10	51	19	43	79	8	45	11	26
Hours Hunted	107	15	15		9	79	19	227	120	16	66	46	79
Mallard	103	4	9	4	2	46	45	4	60	34	6	5	34
Black Duck						1	7	2					
Gadwall	2								1		1		3
Baldpate	4					4				1			
Pintail	8					6	13		52	5	7		5
G. W. Teal	8	5		2		5	1	1	75		1	7	43
B. W. Teal	20	5		6		7	19	2	58		4		6
Shoveller	5					2			2				7
Wood Duck	43					15	1	2	5			1	9
Redhead	2					10	7						
Ring-necked						1			1				
Canvas-back	13					8							2
Iesser Scaup			5			21		12	1	1	11		
Golden-eye													1
Bufflehead													
Ruddy Duck									2				
Merganser									1				
TOTAL DUCKS	208	14	14	12	2	126	93	23	267	41	30	13	110
Canada Geese						4			1		1		3
Blue Geese							4						5
Snow Geese	1						8						
W. F. Geese													
Other Geese													
TOTAL GEESE	1					4	12		1		1		8

TABLE I

RECAPITULATION OF DUCK KILL BY COUNTY

	Hamilton	Hancock	Hardin	Harrison	Howard	Humboldt	Jackson	Jasper	Jefferson	Johnson	Jones	Lee	Louisa	Lucas
Total Number of Hunters Checked:	71	85	38	123	22	4	182	13	28	56	72	144	295	196
Total Number of Hours Hunted	196	145	140	703	51	9	945	19	45	193	311	492	2252	658
None Taken:														
Number of Hunters	12	33	5	33	5	4	51	1	17	23	13	57	78	65
Hours Hunted	33	35	13	158	13	9	234	1	24	77	56	160	533	205
Mallard	47	49	21	132	6		96	6	9	27	44	56	266	68
Black Duck		1					3				1			1
Gadwall	3	1	1									1	1	1
Baldpate	1						3						2	2
Pintail	11	15	9	11			4			6	7	14	3	3
G.W. Teal	11	15	7	8			23	1	2	4	25	22	12	7
B.W. Teal	15	12	7	3			11	8	1	3	40	22	2	26
Shoveller	2										1	1		
Wood Duck	2	2	5	4	1		28				3	13	59	4
Redhead	3		1										4	1
Ring-necked	1			1									1	18
Canvas-back											1	3		
Iesser Scaup	7		1	6	1				4			5	12	86
Golden-eye										1			1	
Bufflehead														5
Ruddy Duck												3		
Merganser			2											
TOTAL DUCKS	103	95	54	165	8	0	168		16	41	122	140	363	222
Canda Geese				8						1	2	4		10
Blue Geese										1				
Snow Geese		3									2			
W. F. Geese														
Other Geese														
TOTAL GEESE		3		8						2	4	4		10

TABLE I

RECAPITULATION OF DUCK KILL BY COUNTY

		Madison	Mahaska	Marshall	Mills	Monona	Monroe	Osceola	Plymouth	Pocahontas	Polk	Poweshiek	Sac	Scott
Total Number Hunters Checked:		3	15	161	84	60	33	81	17	33	161	20	234	88
Total Number of Hours Hunted		7	60	510	285	217	75	305	37	93	446	24	437	457
None Taken														
Number of Hunters			6	91	26	21	19	29	10	13	66		129	32
Hours Hunted			17	264	84	60	51	96	22	37	167		206	139
M	Mallard	4	17	17	14	5	12	18	8	5	25	3	71	32
	Black Duck							8			1			
	Gadwall												7	1
	Baldpate													
	Pintail			9	6		4	7		2	11		11	
	G.W.Teal		4	7	30	24		7	1	3	6	3	5	30
	B.W.Teal			4	1	12		13	2		5		8	1
	Shoveller		1		7	1					5		2	
	Wood Duck		1	9		11	1				5		1	8
	Red Head									2	4			
	Ring-necked							2			1	1		3
	Canvas Back						4				2		1	5
	Lesser Scaup		8	3	2			10			4		3	12
	Golden-eye													
	Bufflehead													
	Ruddy Duck		1					1						
	Merganser		1								3			
	TOTAL DUCKS	4	33	49	60	53	21	66	11	12	72	7	109	92
	Canada Geese			4				2						3
	Blue Geese										1			
	Snow Geese				6	4							1	
	W.F. Geese													
	Other Geese													
	TOTAL GEESE			4	6	4		2			1		1	3

TABLE I

RECAPITULATION OF DUCK KILL BY COUNTY

	Sioux	Tama	Wapello	Washington	Wayne	Winnebago	Worth	Wright
Total Number Hunters Checked:	32	3	47	3	23	248	170	288
Total Number of Hours Hunted	65	10	138	5	74	985	455	751
None Taken:								
Number of Hunters	17	3	26	3	14	65	65	75
Hours Hunted	30	10	76	5	44	245	112	176
Mallard	4		13		6	143	57	128
Black Duck			2			3	1	1
Gadwall						6		
Baldpate						1		1
Pintail			1			63	23	37
G.W. Teal	4		6			13	17	58
B.W. Teal	1		2			57	62	61
Shoveller						3	2	1
Wood Duck	1					13	21	14
Readhead	1					3	1	6
Ring-necked								4
Lesser Scaup			4		10	1	1	6
Canvas-back								
Golden-eye								1
Bufflehead								
Ruddy Duck						4	1	3
Merganser								1
TOTAL DUCKS	10	0	29	0	16	310	186	322
Canada Geese								
Blue Geese								2
Snow Geese	1							2
W.F. Geese								
Other Geese								
TOTAL GEESE	1							4

COMBINED TOTALS AND PERCENTAGES
1948-1949-1950-1951-1952
TABLE II

	Total Recorded Kill By Species 1948	Total Recorded Kill By Species 1949	Total Recorded Kill By Species 1950	Total Recorded Kill By Species 1951	Total Recorded Kill By Species 1952
Hunters Seen Bags Not Checked		3,413	2,807	6,800	2,163
Size of Hunting Party 1	700	523	572	1,198	969
(man) 2	822	951	979	1,907	1,367
(man) 3	417	494	434	800	551
(man) 4	215	274	192	362	232
five (5) or more than 5	91	134	91	207	93
Total Number of Hunters	4,984	5,862	5,170	9,955	6,838
Total Hours Hunted	13,926	18,802	19,132	25,419	20,141
None taken:					
Number of Hunters	1,463	2,021	1,921	2,368	2,557
Hours Hunted	3,171	5,563	6,340	5,029	6,184
Mallard	3,327	2,735	2,344	7,354	2,698
Black Duck	38	26	71	168	54
Gadwall	120	185	98	207	56
Baldpate	58	34	50	231	71
Pintail	546	643	291	1,252	634
G. W. Teal	766	670	399	885	697
B. W. Teal	174	691	637	1,502	810
Shoveller	175	192	91	244	110
Wood Duck	114	133	148	464	427
Redhead	102	79	62	264	71
Ring-necked	48	52	26	138	35
Canvas-back	47	94	43	229	77
Lesser Scaup	439	317	351	787	468
Golden-eye	21	7	9	36	8
Bufflehead	30	11	9	10	9
Ruddy Duck	61	24	19	70	45
Merganser	19	13	18	29	19
TOTAL DUCKS	6,085	5,906	4,666	13,870	6,289
Canada Geese	39	159	73	127	54
Blue Geese	84	380	181	214	21
Snow Geese	70	189	180	128	32
W. F. Geese		9	7		
Other Geese	13	3			2
TOTAL GEESE	206	740	441	469	109
Coots		127	63	344	185
Parties with Dogs		300	240	601	316
Unretrieved Ducks and Geese		37	45	187	69
Parties without Dogs		2,075	2,028	3,873	2,896
Unretrieved Ducks and Geese		260	508	1,680	658
TOTAL PARTIES CHECKED		2,375	2,268	4,474	3,212